

ABSTRACT OF THE DISCLOSURE

This invention provides an iterative process to maximum a posteriori (MAP) decoding. The iterative process uses an auxiliary function which is defined in terms of a complete data probability distribution. The auxiliary function is derived based on an  
5 expectation maximization (EM) algorithm. For a special case of trellis coded modulators, the auxiliary function may be iteratively evaluated by a combination of forward-backward and Viterbi algorithms. The iterative process converges monotonically and thus improves the performance of any decoding algorithm. The MAP decoding minimizes a probability of error. A direct approach to achieve this minimization results in complexity which  
10 grows exponentially with  $T$ , where  $T$  is the size of the input. The iterative process avoids this complexity by converging on the MAP solution through repeated maximization of the auxiliary function.